Having described the invention, what is claimed as new and protected by Letters Patent is:

1. A flat plate nucleotide detection cell, comprising:
an upper flat plate;
a sample chamber formed along a bottom surface of said upper flat plate for holding a sample;
a membrane provided along a portion of said sample chamber for separating a sample in the sample chamber, and
an optical window provided in said upper flat plate, said optical window for permitting light to pass between the sample chamber and a detector for monitoring the sample chamber.

2. The flat plate nucleotide detection cell of claim 1, further comprising:
a syringe docking port in said upper flat plate fluidly coupled to the sample chamber.

3. The flat plate nucleotide detection cell of claim 2, said syringe docking port further comprising:
a seal for providing a fluid-tight seal after being pierced by a needle of a syringe;
a needle stop for preventing the needle from entering said sample chamber.
a needle guide formed in a funnel shape in said syringe docking port to guide the needle toward said sample chamber.

4. The flat plate nucleotide detection cell of claim 2, wherein said syringe docking port further comprises a seal capable of providing a fluid-tight seal after being pierced by a needle.

5. The flat plate nucleotide detection cell of claim 2, wherein said syringe docking port further comprises a needle stop capable of preventing a needle of a syringe from entering said sample chamber.

6. The flat plate nucleotide detection cell of claim 2, further comprising a needle guide formed in said syringe docking port to guide a needle of a syringe toward said sample chamber.

7. The flat plate nucleotide detection cell of claim 6, wherein said needle guide is funnel shaped.

8. The flat plate nucleotide detection cell of claim 1, further comprising a vent hole in fluid communication with the sample chamber providing a vent for the sample chamber.

9. The flat plate nucleotide detection cell of claim 1, wherein the membrane comprises a flat sheet.

10. The flat plate nucleotide detection cell of claim 1, further comprising a filtrate chamber mated to said sample chamber via said membrane.

11. The flat plate nucleotide detection cell of claim 1, further comprising a lower flat plate coupled to the upper flat plate and forming a filtrate chamber, wherein the membrane is mounted between the lower flat plate and the upper flat plate, such that the sample chamber and the filtrate chamber are separated by the membrane.

12. The flat plate nucleotide detection cell of claim 11, wherein the lower flat plate includes a second optical window capable of transmitting light between the filtrate chamber and a detector for monitoring the filtrate chamber.

13. The flat plate nucleotide detection cell of claim 12, wherein the filtrate chamber is offset from the sample chamber.

14. The flat plate nucleotide detection cell of claim 1, wherein the sample chamber is serpentine.

15. The flat plate nucleotide detection cell of claim 14, wherein the sample chamber is S-shaped.

16. The flat plate nucleotide detection cell of claim 1, wherein the membrane has a molecular cut-off such that a labeled nucleotide excision product passes through the membrane.

17. A flat plate nucleotide detection cell, comprising

an upper flat plate;

at least one sample chamber formed along a bottom surface of said upper flat plate;

a lower flat plate forming a filtrate chamber,

a membrane for separating a sample provided along a portion of said sample chamber and mounted between the upper channel plate and the lower channel plate such that the sample chamber and the filtrate chamber at least partially overlap; and

an optical window provided in said lower channel plate, said optical window for permitting light to pass between the filtrate chamber and a detector for monitoring the filtrate chamber.

18. The flat plate nucleotide detection cell of claim 17, further comprising:

a syringe docking port in said upper flat plate fluidly coupled to the sample chamber.

19. The flat plate nucleotide detection cell of claim 18,wherein said syringe docking port further comprises:

a seal for providing a fluid-tight seal after being pierced by a needle of a syringe;

a needle stop for preventing the needle of the syringe from entering said sample chamber.

a needle guide formed in a funnel shape in said syringe docking port to guide the needle of the syringe toward said sample chamber.

20. The flat plate nucleotide detection cell of claim 18, wherein said syringe docking port further comprises a seal for providing a fluid-tight seal after being pierced by a needle.

21. The flat plate nucleotide detection cell of claim 18, wherein said syringe docking port further comprises a needle stop for preventing a needle from entering said sample chamber.

22. The flat plate nucleotide detection cell of claim 18, further comprising a needle guide formed in said syringe docking port to guide a needle toward said sample chamber.

23. The flat plate nucleotide detection cell of claim 22, wherein said needle guide is funnel shaped.

24. The flat plate nucleotide detection cell of claim 17, further comprising a vent hole in fluid communication with the sample chamber providing a vent for the sample chamber.

25. The flat plate nucleotide detection cell of claim 17, wherein the membrane comprises a flat sheet.

26. The flat plate nucleotide detection cell of claim 17, wherein the filtrate chamber is offset from the sample chamber.

27. The flat plate nucleotide detection cell of claim 17, wherein the sample chamber is serpentine.

28. The flat plate nucleotide detection cell of claim 27, wherein the sample chamber is S-shaped.

29. A system for detecting the presence of a nucleotide sequence in a DNA sample, comprising:

a flat plate detection cell having an interior chamber, a membrane provided along a portion of the interior chamber and an optical window providing access to the interior chamber; and

an optical detector positioned relative to the optical window to monitor the interior chamber.

30. The system of claim 29, wherein the interior chamber comprises a sample chamber holding a biological sample, and the optical detector monitors the biological sample.

31. The system of claim 29, wherein the interior chamber comprises a filtrate chamber for collecting a filtrate from the membrane, and the optical detector monitors the filtrate.

32. A method of detecting the presence of a nucleotide sequence in a DNA sample, comprising,

providing a flat plate detection cell having a sample chamber, a filtrate chamber, a membrane provided between the sample chamber and the filtrate chamber and having

a molecular weight cut-off such that a labeled nucleotide excision product passes through the membrane and an optical window providing access to one of the sample chamber and the filtrate chamber;

injecting an admixture into said sample chamber and into contact with a first side of said membrane, said admixture comprising a hybridization product formed of a primer and a strand of DNA in said sample, wherein the primer comprises a sequence of DNA which hybridizes with said strand of DNA adjacent to said first nucleotide position and having a second nucleotide opposite said first nucleotide position, said second nucleotide associated with a label, said second nucleotide hybridizing to said first nucleotide in the event said second nucleotide is complementary to said first nucleotide and said second nucleotide not hybridizing to said first nucleotide in the event said second nucleotide is not complementary, and wherein a proofreading polymerase has been applied to the hybridization product under conditions in which said second nucleotide is preferentially excised to form a labeled nucleotide excision product in the event said second nucleotide is not hybridized to said first nucleotide, and in which said second nucleotide is preferentially incorporated into an extension product in the event said second nucleotide is hybridized to said first nucleotide;

applying one of a dialysis solution to the second side of the membrane and a pressure differential to the sample chamber along the first side of the membrane to pass a labeled nucleotide excision product through the membrane; and

monitoring at least one of the group of: the sample on the first side of the ultrafiltration membrane and a filtrate on the second side of the ultrafiltration membrane, for the presence of a label through said optical window, wherein the presence of a label in the filtrate in concentrations greater than a background amount after a first predetermined time period is indicative of the absence of the first nucleotide, and the presence of a label remaining in the ultrafiltration chamber in concentrations greater than a background amount after a second predetermined time period greater than said first predetermined time period is indicative of the presence of the first nucleotide.